



## Omron Electronics Helps Animals Walk to Better Joint Health



### Abstract

Pets reaching old age and those recovering from injuries now receive medical and therapeutic services to improve quality of life similar to those of their human caretakers. Omron's drives, controls, PLC and HMI operate the Ferno Dog Aquatic Therapy System, a unique treatment for animals

APPLICATION BRIEF

## Omron Electronics Helps Animals Walk to Better Joint Health

Ferno Aquatic Therapy, of Wilmington Ohio, designs and manufactures canine and equine underwater treadmill equipment used by veterinarians to provide aquatic therapy, rehabilitation, and conditioning for both dogs and horses. Designed specifically for canine rehabilitation, the Ferno Aqua Paws Plus Underwater Treadmill System allows dogs to begin the rehabilitation process earlier than normal. Using the buoyancy, resistance and heat properties of water, the Aqua Paws unit creates a low-impact treadmill workout that helps the animal to increase muscle strength and endurance, providing the foundation for a quicker transition to land-based therapy.

“Aqua Paws not only offers rehabilitation from injury and surgery, with reduced recovery time of 50-60%,” points out George Hunter, Ferno’s Aqua Paws Plus product manager, “but also therapy that eases arthritic pain and conditioning for improving performance in dogs with hip dysplasia.”

The Aqua Paws system functions using Omron Electronics sensors, controls, drive and touch screen HMI, all integrated through an Omron PLC.

### In operation

“These electronic controls make the Aqua Paws extremely flexible and adaptable to the needs of each animal being treated,” says Hunter. “The therapist can program into the system the parameters (time, water temperature and depth, treadmill speed and direction) for one dog so that it is exactly repeatable with the touch of a finger. Or, he or she can vary the parameters of the treatment even as it is taking place, using the touch screen.”

Up to 500 individualized therapy programs can be stored and recalled via the touch screen.

Unlike earlier Aqua Paws models that used mechanical controls, once the animal is in the tank, the Omron control system adjusts the water temperature to the preset level, fills the tank to the preset depth, and the treadmill speed, controls the whirlpool-type jets that activate the water when appropriate, and empties the tank at the end of the therapy session. Because the depth of the water can be closely monitored and controlled, the system can safely accommodate a wide size range of animals, from large dogs to small dogs and cats.

The Aqua Paws Plus also features larger viewing areas than earlier models and a longer treadmill belt. The side windows of the unit have been expanded to 72 inches to



allow for maximum visibility of the patient during treatment and the treadmill belt length has been increased to 64" inches to accommodate larger breeds.

## The operating system

At the heart of the Aqua Paws treadmill is the Omron CP1L Micro PLC that controls the speed as well fill and drain operations, temperature and pressure. The CP1L-M30DR-A was equipped with the CP1W-CIF01 RS-232C plug-in serial communications option, the CP1W-MAD11 mixed analog I/O module with 2 analog inputs and 1 analog output, and the CP1W-ME05M program memory cassette for storing data and rebooting.

Connecting the therapist to the control system is an Omron NS8 touch screen HMI, featuring an 8.4-inch color display for setting, monitoring and recording the parameter profiles for each client. The HMI provides 60 MB screen memory and 32,768 colors so client pictures can be stored with each profile. The NS8 HMI has 640 x 480 pixel resolution, 60 MB screen memory and includes Omron HMC-EF183 128 MB flash memory card that saves history files in CSV format, as well as system programs and screen data.



Driving the treadmill is an Omron 3G3MX compact AC drive with open loop-vector control to meet the torque requirements of starting the belt underwater and under client load. This drive provides 3 HP, 2.2 kW, 11 A rated output current and a starting torque capability of 200% at 1 Hz. It includes an energy-saving function that automatically minimizes AC drive output power during periods of constant speed and a micro-surge voltage suppression feature that reduces motor burnout.

Seven proximity sensors of varying sensing distances are used to sense water depth within the therapy water tank. Choosing the most effective sensors for Aqua Paws involved the most interactive cooperation between Ferno and Omron during the system design phase, according to Hunter, since the "whirlpool" feature of the unit tended to affect the pressure readings that determine water depth. The final sensing array is comprised of 4 stainless steel



*Micro PLC model CP1L-M with plug-in communications options controls tank fill, speed and display messages*



*Compact AC drive 3G3MX provides high torque to start the treadmill underwater, under load*

body inductive shielded proximity sensors (M8 size model E2A and M5 size model E2E) with a 1 mm sensing distance and 2 capacitive proximity sensors (model E2K-X) that detect liquid level through the clear containment structure.

Completing the system is a S8VS power supply with built-in run-time monitor display and smart diagnostic displays for output voltage, output current, peak hold current and total run-time of load in 1,000-hour increments.

## Resulting treatment benefits

With the new drive and system of sensors and controls, Ferno is able to increase the benefits that Aqua Paws already offers to pet owners and veterinarians. Those benefits include earlier Intervention and rehabilitation following surgery or injury, a shorter recovery time, effective exercise for dogs of all ages and adjustable water depths for controlled weight-bearing exercises.

“This next generation of our Aqua Paws therapy system enhances those benefits by making them more exactly repeatable, closely controlled and safe for the animal,” says Hunter. Ferno reports that the majority of all U.S. veterinary colleges have the Aqua Paws Underwater Treadmill in their therapy centers.



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